CLAIMS

1. A device for controlling electromagnetic radiation emitted by a structure, the device having a reactive element comprising an array of conductors disposed on a dielectric surface such that the displacement between a conductor and any other conductor adjacent to it is small compared to the wavelength of the electromagnetic radiation thereby causing the array of conductors to represent an effectively continuous conductive surface to the electromagnetic radiation, wherein the surface impedance of the conductive surface is reactive.

2. A device according to claim 1, wherein the dielectric surface of the reactive element is planar.

3. A device according to claim 1 or claim 2, wherein the electromagnetic radiation has more than one wavelength.

4. A device according to any of the preceding claims, wherein the electromagnetic radiation has more than one polarisation.

5. A device according to any of the preceding claims, wherein the surface impedance of the reactive element is inductive.

6. A device according to any of claims 1 to 4, wherein the surface impedance of the reactive element is capacitive.

7. A device according to any of claims 1 to 4, wherein the surface impedance of the reactive element is capacitive in some regions of the dielectric surface and inductive in the remaining regions of the dielectric surface.

8. A device according to any of the preceding claims, wherein the magnitude of the surface impedance of the reactive element varies at different positions on the dielectric surface.

9. A device according to any of the preceding claims, wherein the conductors of the reactive element are substantially periodically disposed with respect to each other on the dielectric surface.

10. An antenna comprising a conductive equipotential surface; a device according to any of the preceding claims, the reactive element of which is disposed parallel to the equipotential surface; an emitter for emitting electromagnetic radiation that is guided between the equipotential surface and the reactive element; and an actuating mechanism for adjusting the displacement between the equipotential surface and the reactive element so that the angle of propagation of a beam of electromagnetic radiation that leaks through the reactive element can be varied.

11. A method of directing a beam of electromagnetic radiation using an antenna according to claim 10, the method comprising causing the emitter to emit electromagnetic radiation; guiding the electromagnetic radiation between the equipotential surface and the reactive element; and adjusting the displacement between the equipotential surface and the reactive element using the actuating mechanism so that the angle of propagation of the beam of electromagnetic radiation that leaks through the reactive element is set to a predetermined value.

12. A method of scanning a beam of electromagnetic radiation using an antenna according to claim 10, the method comprising causing the emitter to emit electromagnetic radiation; guiding the electromagnetic radiation between the equipotential surface and the reactive element; and cyclically varying the displacement between the equipotential surface and the reactive element using the actuating mechanism so that the angle of propagation of the beam of electromagnetic radiation that leaks through the reactive element oscillates between two values.

13. An antenna comprising a conductive equipotential surface; a device according to any of claims 1 to 9, the reactive element of which is disposed parallel to the equipotential surface; an emitter for emitting electromagnetic radiation that is guided between the

equipotential surface and the reactive element; and a layer of active dielectric material disposed between the equipotential surface and the reactive element wherein the angle of propagation of a beam of electromagnetic radiation that leaks through the reactive element can be varied by adjusting a biassing potential across the layer of active dielectric material.

14. An antenna according to claim 13, further comprising an actuating mechanism for adjusting the displacement between the equipotential surface and the reactive element so that the angle of propagation of the beam of electromagnetic radiation that leaks through the reactive element can be varied.

15. An antenna according to any of claims 10, 11, 12 or 14 wherein the actuating mechanism comprises a hydraulic actuator or a piezoelectric actuator, or an electric motor.

16. An antenna according to any of claims 10 to 15, wherein the emitter is a dual polarisation collimated source or is a dual polarised planar feed or a conformal array feed.

17. An antenna according to any of claims 13 to 15 when dependent upon claim 13, wherein the active dielectric material is titanium dioxide.

18. A method of directing a beam of electromagnetic radiation using an antenna according to any of claims 13 to 17 when dependent upon claim 13, the method comprising causing the emitter to emit electromagnetic radiation; guiding the electromagnetic radiation between the equipotential surface and the reactive element; and adjusting the biassing potential across the equipotential surface and the reactive element so that the angle of propagation of the beam of electromagnetic radiation that leaks through the reactive element is set to a predetermined value.

19. A method of scanning a beam of electromagnetic radiation using an antenna according to any of claims 13 to 17 when dependent upon claim 13, the method comprising

causing the emitter to emit electromagnetic radiation; guiding the electromagnetic radiation between the equipotential surface and the reactive element; and cyclically varying the biassing potential across the equipotential surface and the reactive element so that the angle of propagation of the beam of electromagnetic radiation that leaks through the reactive element oscillates between two values.

20. An antenna comprising a conductive cavity, one boundary of which comprises a first device according to any of claims 1 to 9, the reactive element of which is adapted to present a capacitive surface impedance; and an emitter disposed within the cavity for emitting electromagnetic radiation.

21. An antenna according to claim 20, wherein a boundary of the cavity opposite the reactive element of the first device is an equipotential surface.

22. An antenna according to claim 20, wherein a boundary of the cavity opposite the reactive element of the first device comprises a second device according to any of claims 1 to 9, the reactive element of which is adapted to present a capacitive surface impedance.

23. An antenna according to any of claims 20 to 22, wherein the cavity is formed using a printed circuit board substrate with the first device being printed on a top layer of the substrate and plated through holes connecting the top layer to the bottom layer which forms the opposite boundary, the plated through holes thereby forming the sides of the cavity.

24. An antenna according to claim 23, wherein the emitter is printed on an iner layer of a substrate.

25. An choke comprising a conductive cavity, one boundary of which is formed by a set of annular, concentric devices according to any of claims 1 to 9 with regions of dielectric disposed therebetween.